3/15/04 PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Jürgen LEGNER and Wolfgang REBHOLZ
Serial no.	:	
For	:	DRIVE TRAIN FOR POWERING A MOBILE VEHICLE
Docket	:	ZAHFRI P605US

MAIL STOP PATENT APPLICATION
The Commissioner for Patents
U.S. Patent & Trademark Office
P. O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Dear Sir:

By way of preliminary amendment, please amend the above identified application as set forth below.

In the Specification:

Please amend paragraphs 002, 003, 004, 005, 009, 010, 014, 015, 016, 017 and 018 of the specification as follows in which the specification additions are shown by underlining and the specification deletions are shown by strikeout. Please enter the replacement specification paragraphs into the record of this case.

In the Claims:

Please cancel claims 1-10, without prejudice or disclaimer of the subject matter therein, in favor of new claims 11-20 as follows.

[002] This application claims priority from German Application Serial No. 103 14 329.7 filed March 28, 2003.

[003] FIELD OF THE INVENTION

[004] The invention relates to a drive train for powering a mobile vehicle~~, of the type defined in more detail in the preamble of Claim 1~~.

[005] BACKGROUND OF THE INVENTION

[009] This objective is achieved with a drive train of the type described for powering a mobile vehicle~~, which also has the characterizing features of the principal claim~~.

[010] SUMMARY OF THE INVENTION

[014] BRIEF DESCRIPTION OF THE DRAWING

[015] ~~Further characteristics emerge from the description of the figure.~~ The invention will now be described, by way of example, with reference to the accompanying drawings in which:

[016 Fig. 1 shows a drive engine with an output shaft driving a pump impeller of a hydrodynamic converter via a primary clutch.

[017] DETAILED DESCRIPTION OF THE INVENTION

[018] The single Figure shows a drive engine 1, whose output shaft drives a pump impeller 3 of a hydrodynamic converter 4 via a primary clutch 2. The drive engine 1 is also connected to a hydraulic pump 5 of the working hydraulic system. The hydraulic pump 5 can be connected to the drive input of the primary clutch 2. The hydraulic pump 5 is preferably a load-sensing pump. The delivery volume of the hydraulic pump 5 is conveyed to consumer 7 such as the scoop of a wheel loader via a valve 6. An electronic control unit 8 processes signals coming from sensors in a brake pedal 9, a driving speed pedal 10, the

control lever 11 for the working hydraulic system, the load condition of the drive engine 1, the speed of the pump impeller 3 and the input speed into the speed-change transmission 12. As a function of these parameters, when the larger hydraulic pump 5 with an adjustable delivery volume is used, the electronic control unit regulates the delivery volume or, when an adjustable transmission ratio (not shown) between the hydraulic pump 5 and the drive engine 1 is used, the electronic control system 8 adjusts the transmission ratio. For example, if the drive engine 1 is in the part-load range and, by virtue of the actuation of the control lever 11, the electronic control system 8 recognizes a demand of the hydraulic pump 5 for a volume flow, then the volume flow of the hydraulic pump 5 is increased either by adjusting the hydraulic pump 5 or by adjusting the transmission ratio between the hydraulic pump 5 and the drive engine 1. For example, if the electronic control system 8 recognizes, from the position of the driving speed pedal 10, that the vehicle should be at low speed or even at rest, and from the control lever 11 that a volume flow is demanded by the hydraulic pump 5, the primary clutch 2 is actuated in the opening direction and, depending on the load condition of the drive engine 1, the delivery volume of the hydraulic pump 5 or the transmission gear, between the drive engine 1 and the hydraulic pump 5, is adjusted in such a manner that the volume flow of the hydraulic pump 5 increases without the driving speed also increasing. But, if the electronic control system 8 recognizes from the driving speed pedal 10 that the vehicle is moving at high speed while the drive engine 1 is in the part-load range and, from the control lever 11, that a volume flow is needed for the working hydraulic system, then the hydraulic pump 5 is adjusted to give a larger delivery volume or the transmission ratio between the hydraulic pump 5 and the drive engine 1 is also adjusted such that the hydraulic pump 5 delivers a larger volume. However, the volume flow of the hydraulic pump 5 or the transmission ratio of the transmission gear between the hydraulic pump 5 and the drive engine 1 is only adjusted to the extent that the speed of the drive engine 1 does not fall below a defined value.

1-10. (CANCELED)

11. (NEW) A drive train for powering a mobile vehicle with a drive engine (1), which powers, on one hand, a drive input of a propulsion drive via a shiftable step-down transmission (12) and, on another hand, an auxiliary drive output for driving at least a hydraulic pump (5), wherein before the auxiliary drive output there is arranged a transmission gear which adjusts a transmission ratio as a function of a required delivery volume of the hydraulic pump (5) and as a function of a speed and of a load condition of the drive engine (1).

12. (NEW) The drive train according to claim 11, wherein the step-down transmission (12) is continuously adjustable.

13. (NEW) The drive train according to claim 11, wherein in full-load operation below a defined speed of the drive engine (1), the transmission gear is adjusted to a higher transmission ratio so that a drive input speed of the hydraulic pump (5) decreases.

14. (NEW) The drive train according to claim 11, wherein in part-load operation below a defined speed of the drive engine (1), the transmission gear is adjusted to a lower transmission ratio so that the drive input speed of a hydraulic pump (5) increases.

15. (NEW) The drive train according to claim 11, wherein in full-load operation below a defined speed of the drive engine (1) and delivery volume requirement of the hydraulic pump (5), a clutch (2) arranged between a hydrodynamic converter (4) and the drive engine (1) is actuated in a opening direction as far as to result in a defined minimum speed of the drive engine.

16. (NEW) A drive train for powering a mobile vehicle with a drive engine (1), which powers, on one hand, a shiftable step-down transmission (12) for driving a propulsion drive via a hydrodynamic converter (4) and, on another hand, an auxiliary drive output for driving at least an adjustable hydraulic pump (5), wherein the adjustable hydraulic pump (5) is adjusted as a function of a required delivery volume of the hydraulic pump (5) and as a function of speed and of a load condition of the drive engine.

17. (NEW) The drive train according to claim 16, wherein the hydraulic pump(5) can be adjusted continuously.

18. (NEW) The drive train according to claim 16, wherein in full-load operation below a defined speed of the drive engine (1) the hydraulic pump (5) is adjusted to deliver a smaller volume flow.

19. (NEW) The drive train according to claim 16, wherein in part-load operation below a defined speed of the drive engine (1) the hydraulic pump (5) is adjusted to deliver a larger volume flow.

20. (NEW) The drive train according to claim 16, wherein in full-load operation below a defined speed of the drive engine (1) and delivery volume requirement of the hydraulic pump (5), the clutch (2) arranged between the hydrodynamic converter (4) and the drive engine (1) is actuated in an opening direction as far as to result in a defined minimum speed of the drive engine.